

Characterization of Human Risk from Air Pollutants

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Software is being developed to aid in the characterization of human risk from pollutants emitted to air. The software can be used to perform short-term risk estimations (such as risk posed by an accidental release) or long-term risk estimations (such as risk posed by daily exposure to emissions from a chemical facility). The software uses a series of mathematical models to quantitatively estimate human risk. An air dispersion model (ISC3) is used to estimate air concentrations near a pollutant source. A multimedia model is used to determine the concentration of the chemical in the environment (air, soil, water, and sediment). An exposure model is used to relate concentrations in the multimedia compartments to human exposure. Finally, human risk is characterized using the exposure intake and the toxicity of the chemical. The software utilizes data obtained from a variety of sources to provide a more accurate characterization of risk. The model uses National Land Cover Data (NLCD) obtained from the U.S. Geological Survey (USGS) to determine what is in the vicinity of a pollutant source (such as residential areas, crops, open water, etc.). The NLCD data aids in defining the dimensions of the multimedia compartments and in determining which exposure pathways affect exposure. Population statistics (U.S. Census Bureau) are used to determine how the population is distributed near the pollutant source. Elevation data (USGS) and meteorological data (National Climatic Data Center) are used in the air dispersion model calculations to provide site specificity. The software is currently in the developmental stage, but when it is finished, many offices in the EPA (i.e. NHSRC, OECA, or OPPT) could use it to perform human risk assessments depending on their specific needs.